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**[TITLE OF THE INVENTION] REMOTE MAINTENANCE CONTROLLER****[SUMMARY]**

[Object] To provide a remote maintenance controller which can enhance the efficiency of inspection and maintenance work for each peripheral equipment in a system connecting plural peripheral equipment via a network and can reduce a load upon a manager.

[Configuration] PC 1 executes execution instruction processing for instructing peripheral equipment to execute a self-diagnosis function, analysis processing for receiving the result of self-diagnosis of the peripheral equipment from sending means mounted in the respective peripheral equipment and analyzing the result of the self-diagnosis, electronic mail sending processing for generating maintenance control information showing a fault situation and a used situation of each peripheral equipment based upon the analyzed result of the result of the self-diagnosis and sending an electronic mail including the maintenance control information to PC 9 and facsimile sending processing for generating maintenance control information and sending it to facsimile terminal equipment 8.

**[Claims]**

[Claim 1] A remote maintenance controller used in a system connecting plural peripheral equipment provided with a self-diagnosis function such as a printer, facsimile terminal equipment and a copying machine via a network, comprising:

instruction means that instructs respective peripheral equipment to execute self-diagnosis via the network;

sending means that is mounted in the respective peripheral equipment and that sends the result of self-diagnosis executed by the peripheral equipment according to instruction from the instruction means via the network;

analysis means that receives the result of the self-diagnosis of the peripheral equipment from each sending means and analyzes the result of the self-diagnosis; and

maintenance control information generation means that generates maintenance control information showing a fault situation and a used situation of each peripheral equipment based upon the result analyzed by the analysis means.

[Claim 2] A remote maintenance controller according to Claim 1, further comprising:

notification means that notifies a maintenance manager of the system of the maintenance control information.

[Claim 3] A remote maintenance controller according to Claim 1, wherein:

the instruction means, the analysis means and the

maintenance control information generation means are mounted in a terminal utilizing the peripheral equipment via the network.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention relates to a remote maintenance controller used in a system connecting plural peripheral equipment provided with a self-diagnosis function such as a printer, facsimile terminal equipment and a copying machine via a network.

[0002]

[Prior Art] Generally, a self-diagnosis function for diagnosing whether a fault which prevents suitable operation occurs or not is provided to peripheral equipment such as a printer, facsimile terminal equipment and a copying machine. When a fault occurs, a message showing that the fault occurs is displayed by the self-diagnosis function and a user knows that the fault occurs in the peripheral equipment owing to the display. The user who verifies that the fault occurs takes proceedings for removing the fault from the peripheral equipment. In case the degree of the fault is light, the user can remove the fault, however, in case the fault is serious, the user makes contact with a service man and the service man takes action for removing the fault.

[0003] Recently, a system connecting multiple peripheral

equipment such as a printer, facsimile terminal equipment and a copying machine via a network appears and as many peripheral equipment are included in the system, a manager that manages each peripheral equipment is predetermined and regularly maintains and inspects each peripheral equipment. When a user of peripheral equipment verifies that a fault occurs in the peripheral equipment, the user notifies the manager of the peripheral equipment in which the fault occurs and the degree of the fault and the manager that receives the notice takes action such as makes a contact with a service man.

[0004]

[Problem that the Invention is to Solve] However, as described above, as peripheral equipment is regularly maintained and inspected by a manager in a system connecting multiple peripheral equipment via a network, the efficiency of work for the inspection and maintenance of each peripheral equipment is low and a load upon a manager is large.

[0005] The object of the invention is to provide a remote maintenance controller that can enhance the efficiency of the inspection and maintenance work of each peripheral equipment in a system connecting plural peripheral equipment via a network and can reduce a load upon a manager.

[0006]

[Means for Solving the Problem] A first aspect of the invention is based upon a remote maintenance controller used in a system

connecting plural peripheral equipment provided with a self-diagnosis function such as a printer, facsimile terminal equipment and a copying machine via a network and is characterized in that instruction means that instructs respective peripheral equipment to execute self-diagnosis via the network, sending means that is mounted in the respective peripheral equipment and sends the result of self-diagnosis executed by each peripheral equipment according to instruction from the instruction means via the network, analysis means that receives the result of the self-diagnosis of each peripheral equipment from each sending means and analyzes the result of the self-diagnosis and maintenance control information generation means that generates maintenance control information showing the fault situation and the used situation of each peripheral equipment based upon the result of analysis by the analysis means are provided.

[0007] A second aspect of the invention is based upon the remote maintenance controller according to the first aspect and is characterized in that notification means that notifies a maintenance manager of the system of the maintenance control information is further provided.

[0008] A third aspect of the invention is based upon the remote maintenance controller according to the first aspect and is characterized in that the instruction means, the analysis means and the maintenance control information generation means are

mounted in terminal equipment utilizing the peripheral equipment via the network.

[0009]

[Action] In the remote maintenance controller according to the first aspect, the instruction means instructs respective peripheral equipment to execute self-diagnosis via the network, the sending means mounted in the respective peripheral equipment sends the result of self-diagnosis executed by each peripheral equipment according to instruction from the instruction means via the network, the analysis means receives the result of the self-diagnosis by each peripheral equipment from each sending means and analyzes the result of the self-diagnosis and the maintenance control information generation means generates maintenance control information showing the fault situation and the used situation of each peripheral equipment based upon the analysis result by the analysis means.

[0010] In the remote maintenance controller according to the second aspect, the notification means notifies a maintenance manager of the system of the maintenance control information.

[0011] For the configuration of the remote maintenance controller according to the third aspect, the instruction means, the analysis means and the maintenance control information generation means are mounted in terminal equipment utilizing peripheral equipment via the network.

[0012]

[Mode for Carrying out the Invention] Referring to the drawings, embodiments of the invention will be described below.

[0013] (First Embodiment) FIG. 1 is a block diagram showing the configuration of a network in which a remote maintenance controller equivalent to an embodiment of the invention is used and FIG. 2 is a block diagram showing the configuration of a personal computer forming a main part of the remote maintenance controller shown in FIG. 1.

[0014] In the network system, as shown in FIG. 1, each peripheral equipment such as a printer 2, facsimile terminal equipment 3 and a copying machine 4, terminal equipment utilizing each peripheral equipment such as a personal computer (not shown), a personal computer 1 for centralized control (hereinafter called PC) and PC for a manager 9 that controls the network system are connected via a network 5.

[0015] Means that executes a self-diagnosis function and sending means that sends the result of self-diagnosis are provided to each peripheral equipment such as the printer 2, the facsimile terminal equipment 3 and the copying machine 4. The self-diagnosis function includes a function for diagnosing the situation of a fault of whether a fault occurs or not and a function for managing a used situation such as used time and consumed quantity of consumer goods, and the result of self-diagnosis includes diagnosis result information related

to fault information and management information related to a used situation.

[0016] Facsimile terminal equipment 8 is connected to PC 1 via a telephone line 6 and a public telecommunication network 7 and is installed in a service center in which each peripheral equipment is inspected and repaired.

[0017] PC 1 is provided with CPU 10 that executes operation and processing according to a control program stored in a memory 11 as shown in FIG. 2.

[0018] The control program stored in the memory 11 includes a system control program, an execution instruction program for instructing peripheral equipment to execute a self-diagnosis function, a program for receiving the result of the self-diagnosis of peripheral equipment from sending means mounted in respective peripheral equipment, an analysis program for analyzing the result of the self-diagnosis, an electronic mail sending program for generating maintenance control information showing the fault situation and the used situation of each peripheral equipment based upon the analysis result of the result of the self-diagnosis and sending an electronic mail including the maintenance control information to PC 9 and a facsimile sending program for generating the maintenance control information and sending the maintenance control information to the facsimile terminal equipment 8.

[0019] In the memory 11, information related to the maintenance

of peripheral equipment is stored together with the control program. The information related to the maintenance of peripheral equipment includes reference operating time for inspection and maintenance and others.

[0020] A modem/NCU 12, a network interface 13 and an external storage 14 are connected to CPU 10 via a bus 15 together with the memory 11.

[0021] The modem/NCU 12 is used when facsimile is sent and connects the facsimile terminal equipment 8 via the telephone line 6.

[0022] The network interface 13 connects CPU 10 and each equipment on the network 5.

[0023] The analysis result of the result of self-diagnosis is stored in the external storage 14.

[0024] CPU 10, the control program stored in the memory 11, the modem/NCU 12, the network interface 13, the external storage 14 and the sending means provided to each peripheral equipment compose the remote maintenance controller for maintaining and controlling each peripheral equipment in cooperation.

[0025] Next, referring to FIG. 3, the maintenance and control of each peripheral equipment by PC 1 will be described. FIG. 3 is a flowchart showing a procedure for the maintenance and control by PC 1 of each peripheral equipment in the network system shown in FIG. 1.

[0026] Referring to FIG. 3, first, it is determined whether fixed time elapses since self-diagnosis is executed by each peripheral equipment last or not (a step S31). This determination is executed to make each peripheral equipment regularly diagnose itself.

[0027] When fixed time elapses since the last execution of self-diagnosis by each peripheral equipment, the execution instruction program is activated and an instruction to execute self-diagnosis is issued to each peripheral equipment via the network interface 3 and the network 5 (a step S32).

[0028] After the instruction to execute self-diagnosis is issued, a receiving state is held for fixed time to receive the result of the self-diagnosis from each peripheral equipment (steps S33 and S34).

[0029] When the fixed time elapses or when the result of the self-diagnosis is received from each peripheral equipment, the result received within the fixed time of the self-diagnosis of the peripheral equipment is analyzed according to the analysis program and it is determined based upon the result of the analysis of the self-diagnosis result whether a light error (fault) occurs or not (a step S35). When the result of the self-diagnosis of peripheral equipment is not received within fixed time, the peripheral equipment is judged to be in a state in which the peripheral equipment is not powered. The above-mentioned light error means an error which can be

recovered without processing by a service man such as the disconnection of power supply, the shortage of paper and toner and jam.

[0030] When a light error occurs, information showing ID (or the name) of peripheral equipment in which the light error occurs and the contents of the error is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail and the text information is stored in the memory 11 as maintenance control information (a step S36). For example, maintenance control information stored in the memory 11 has the following contents.

[0031] "A fatal error occurs in the facsimile terminal equipment of a section △△△ of XXXX Co., Ltd." is short of toner."

"The printer of a section ○○○ of XXXX Co., Ltd. is short of paper."

When no light error occurs or after maintenance control information showing the name of peripheral equipment in which a light error occurs and the contents of the error is stored in the memory 11, it is determined based upon the result of analysis of the self-diagnosis result whether a serious error occurs or not (a step S37). The serious error means a fatal error which cannot be recovered without a service man.

[0032] When a serious error occurs, information showing ID (or

the name) of peripheral equipment in which the serious error occurs and the contents of the error is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail, the text information is stored in the memory 11 as maintenance control information, the information converted to the text information is converted to image information according to the facsimile sending program so that the information can be sent by facsimile and the image information is stored in the memory 11 as maintenance control information (a step S38). For example, maintenance control information including text information or image information has the following contents.

[0033] "A fatal error occurs in the facsimile terminal equipment of a section △△△ of XXXX Co., Ltd."

When no fatal error occurs or after maintenance control information showing the name of peripheral equipment in which a fatal error occurs and the contents of the error is stored in the memory 11, information related to a used situation included in the result of self-diagnosis every peripheral equipment and information related to maintenance stored in the memory 11 are compared and it is determined whether inspection and maintenance are required for the peripheral equipment or not (a step S39).

[0034] When inspection and maintenance are required, information showing the name of peripheral equipment requiring

inspection and maintenance is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail, the text information is stored in the memory 11 as maintenance control information, the text information is converted to image information according to the facsimile sending program so that the information can be sent by facsimile and the image information is stored in the memory 11 as maintenance control information (a step S40). For example, maintenance control information including text information or image information has the following contents.

[0035] "The copying machine of a section △△△ of XXXX Co., Ltd. requires inspection and maintenance."

When no inspection and maintenance are required or after maintenance control information showing the name of peripheral equipment requiring inspection and maintenance is stored in the memory 11, it is determined whether all peripheral equipment on the network 5 are instructed to execute self-diagnosis or not (a step S41). It is determined based upon the result of the analysis of the self-diagnosis result whether a fatal error occurs or not (a step S37). When peripheral equipment which is not instructed to execute self-diagnosis exists, processing from the step S32 is repeated to instruct the peripheral equipment to execute self-diagnosis.

[0036] When the instruction to execute self-diagnosis is

finished for all peripheral equipment, it is determined whether maintenance control information sent by an electronic mail is stored in the memory 11 or not (a step S42).

[0037] When maintenance control information sent by an electronic mail is stored in the memory 11, the maintenance control information composed of text information is included in an electronic mail according to the electronic mail sending program and the electronic mail is sent to PC 9 for the manager via the network interface 13 and the network 5 (a step S43).

[0038] When maintenance control information sent by an electronic mail is not stored in the memory 11 or after maintenance control information is sent by an electronic mail, it is determined whether maintenance control information sent by facsimile is stored in the memory 11 or not (a step S44).

[0039] When maintenance control information sent by facsimile is stored in the memory 11, the maintenance control information composed of image information is sent to the facsimile terminal equipment 8 of the service center via the modem/NCU 12, the telephone line 6 and the public telecommunication network 7 according to the facsimile sending program (a step S45).

[0040] When maintenance control information sent by facsimile is not stored in the memory 11 or after maintenance control information is sent by facsimile, maintenance control information stored in the memory 11 is stored in the external storage 14 (a step S46).

[0041] As described above, as maintenance control information showing the occurrence of an error and the need for inspection and maintenance in each peripheral equipment on the network 5 is controlled by only PC 1 and is notified the manager or the service center if necessary, the efficiency of inspection and maintenance work for each peripheral equipment can be enhanced and a load upon the manager can be reduced.

[0042] Also, as PC 1 composes the main part of the remote maintenance controller, the control of the remote maintenance controller can be facilitated, compared with a case that the remote maintenance controller is independently installed.

[0043] (Second Embodiment) Next, referring to FIG. 4, a second embodiment of the invention will be described.

[0044] The configuration of this embodiment is the same as that of the first embodiment.

[0045] Next, referring to FIG. 4, the inspection and maintenance operation of PC 1 for each peripheral equipment will be described. FIG. 4 is a flowchart showing a procedure for the inspection and maintenance operation for each peripheral equipment in the second embodiment of the remote maintenance controller according to the invention.

[0046] As shown in FIG. 4, it is determined whether the result of self-diagnosis is received from each peripheral equipment or not (a step S51). The determination is repeated until the result of self-diagnosis is received from each peripheral

equipment.

[0047] When the result of self-diagnosis is received from each peripheral equipment, the result of the self-diagnosis of peripheral equipment received within fixed time is analyzed according to an analysis program and it is determined based upon the result of analysis of the self-diagnosis result whether a light error (fault) occurs or not (a step S52).

[0048] When the light error occurs, information showing the name (or ID) of the peripheral equipment in which the light error occurs and the contents of the error is converted to text information according to an electronic mail sending program so that the information can be sent by an electronic mail and the text information is stored in a memory 11 as maintenance control information (a step S53). For example, maintenance control information stored in the memory 11 has the following contents.

[0049] "The copying machine of a section △△△ of XXXX Co., Ltd. is short of toner."

When no light error occurs or after maintenance control information showing the name of peripheral equipment in which a light error occurs and the contents of the error is stored in the memory 11, it is determined based upon the result of analysis of the self-diagnosis result whether a serious error occurs or not (a step S54).

[0050] When a serious error occurs, information showing the

name (or ID) of peripheral equipment in which the serious error occurs and the contents of the error is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail, the text information is stored in the memory 11 as maintenance control information, the information converted to the text information is converted to image information according to a facsimile sending program so that the information can be sent by facsimile and the image information is stored in the memory 11 as maintenance control information (a step S55). For example, maintenance control information including text information or image information has the following contents.

[0051] "A fatal error occurs in the facsimile terminal equipment of a section △△△ of XXXX Co., Ltd."

When no serious error occurs or after maintenance control information showing the name of peripheral equipment in which a serious error occurs and the contents of the error is stored in the memory 11, it is determined every peripheral equipment whether the result of self-diagnosis includes information requiring inspection and maintenance or not (a step S56).

[0052] When inspection and maintenance are required, information showing the name of peripheral equipment requiring inspection and maintenance is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail, the text

information is stored in the memory 11 as maintenance control information and is converted to image information according to the facsimile sending program so that the text information can be sent by facsimile and the image information is stored in the memory 11 as maintenance control information (a step S57). For example, maintenance control information including text information or image information has the following contents.

[0053] "The copying machine of a section △△△ of XXXX Co., Ltd. requires inspection and maintenance."

When no inspection and no maintenance are required or after maintenance control information showing the name of peripheral equipment requiring inspection and maintenance is stored in the memory 11, it is determined whether the cause of an error caused in the peripheral equipment is removed or not (a step S58).

[0054] When the cause of the error caused in the peripheral equipment is removed, information showing the name of the peripheral equipment from which the cause of the error is removed and that the cause of the error is removed is converted to text information according to the electronic mail sending program so that the information can be sent by an electronic mail and the text information is stored in the memory 11 as maintenance control information (a step S59). For example, maintenance control information including text information or

image information has the following contents.

[0055] "The shortage of toner caused in the copying machine of a section △△△ of XXXX Co., Ltd. is solved."

When the cause of an error caused in peripheral equipment is not removed yet or after maintenance control information showing the name of peripheral equipment from which the cause of an error is all removed and that the cause of the error is removed is stored in the memory 11, it is determined whether maintenance control information sent by an electronic mail is stored in the memory 11 or not (a step S60).

[0056] When maintenance control information sent by an electronic mail is stored in the memory 11, the maintenance control information composed of text information is included in an electronic mail according to the electronic mail sending program and the electronic mail is sent to PC 9 for a manager via a network interface 13 and a network 5 (a step S61).

[0057] When maintenance control information sent by an electronic mail is not stored in the memory 11 or after maintenance control information is sent by an electronic mail, it is determined whether maintenance control information sent by facsimile is stored in the memory 11 or not (a step S62).

[0058] When maintenance control information sent by facsimile is stored in the memory 11, the maintenance control information including image information is sent to the facsimile terminal equipment 8 of the service center via a modem/NCU 12, a

telephone line 6 and a public telecommunication network 7 according to the facsimile sending program (a step S63).

[0059] When maintenance control information sent by facsimile is not stored in the memory 11 or after maintenance control information is sent by facsimile, maintenance control information stored in the memory 11 is stored in an external storage 14 (a step S64).

[0060] As described above, as maintenance control information showing the occurrence of an error and the need for inspection and maintenance in each peripheral equipment on the network 5 is controlled by only PC 1 and is notified the manager or the service center if necessary, the efficiency of inspection and maintenance work for each peripheral equipment can be enhanced and a load upon the manager can be reduced.

[0061]

[Effect of the Invention] According to the remote maintenance controller according to the first aspect, as the instruction means instructs respective peripheral equipment to execute self-diagnosis via the network, the sending means mounted in the respective peripheral equipment sends the result of self-diagnosis executed by the peripheral equipment via the network according to the instruction from the instruction means, the analysis means receives the result of the self-diagnosis of each peripheral equipment from each sending means and analyzes the result of the self-diagnosis and the maintenance

control information generation means generates maintenance control information showing the fault situation and the used situation of each peripheral equipment based upon the result analyzed by the analysis means, the efficiency of inspection and maintenance work for each peripheral equipment can be enhanced and a load upon the manager can be reduced.

[0062] According to the remote maintenance controller according to the second aspect, as the notification means notifies the maintenance manager of the system of maintenance control information, the efficiency of inspection and maintenance work for each peripheral equipment can be further enhanced and a load upon the manager can be further reduced.

[0063] According to the remote maintenance controller according to the third aspect, as the instruction means, the analysis means and the maintenance control information generation means are mounted in terminal equipment utilizing peripheral equipment via the network, the control of the remote maintenance controller can be facilitated, compared with a case that the remote maintenance controller is independently installed.

[Brief Description of the Drawings]

[FIG. 1] FIG. 1 is a block diagram showing the configuration of a network in which an embodiment of a remote maintenance controller according to the invention is used;

[FIG. 2] FIG. 2 is a block diagram showing the configuration

of a personal computer composing the main part of the remote maintenance controller shown in FIG. 1;

[FIG. 3] FIG. 3 is a flowchart showing a procedure for the inspection and maintenance operation of PC 1 for each peripheral equipment in the network system shown in FIG. 1; and

[FIG. 4] FIG. 4 is a flowchart showing a procedure for the inspection and maintenance operation for each peripheral equipment in a second embodiment of the remote maintenance controller according to the invention.

[Description of the Reference Numerals and Signs]

1. PC (Remote maintenance controller)

2. Printer

3, 8. Facsimile terminal equipment

4. Copying machine

5. Network

6. Telephone line

7. Public telecommunication network

9. PC

10. CPU

11. Memory

12. Modem/NCU

13. Network interface

14. External storage

DRAWINGS

[FIG. 1]

2. PRINTER

3. FACSIMILE TERMINAL EQUIPMENT

4. COPYING MACHINE

7. PUBLIC TELECOMMUNICATION NETWORK

8. FACSIMILE TERMINAL EQUIPMENT

[FIG. 2]

11. MEMORY

12. MODEM/NCU

13. NETWORK INTERFACE

14. EXTERNAL STORAGE

[FIG. 3]

START

S31. DOES FIXED TIME ELAPSE?

S32. INSTRUCT DIAGNOSIS

S33. DOES FIXED TIME ELAPSE?

S34. IS RESULT RECEIVED?

S35. IS DEGREE OF ERROR LIGHT?

S36. GENERATE ELECTRONIC MAIL

S37. IS DEGREE OF ERROR SERIOUS?

S38. GENERATE ELECTRONIC MAIL AND FACSIMILE IMAGE

S39. ARE INSPECTION AND MAINTENANCE REQUIRED?

S40. GENERATE ELECTRONIC MAIL AND FACSIMILE IMAGE

S41. ARE ALL DIAGNOSED?

S42. IS MAINTENANCE CONTROL INFORMATION SENT BY ELECTRONIC MAIL STORED?

S43. SEND ELECTRONIC MAIL

S44. ARE THERE CONTENTS SENT BY FACSIMILE?

S45. SEND BY FACSIMILE

S46. STORE RESULT IN EXTERNAL STORAGE

END

[FIG. 4]

START

S51. IS RESULT OF DIAGNOSIS RECEIVED?

S52. IS DEGREE OF ERROR LIGHT?

S53. GENERATE ELECTRONIC MAIL

S54. IS DEGREE OF ERROR SERIOUS?

S55. GENERATE ELECTRONIC MAIL AND FACSIMILE IMAGE

S56. IS MAINTENANCE REQUIRED?

S57. GENERATE ELECTRONIC MAIL AND FACSIMILE IMAGE

S58. IS ERROR RECOVERED?

S59. GENERATE ELECTRONIC MAIL

S60. IS MAINTENANCE CONTROL INFORMATION SENT BY ELECTRONIC MAIL STORED?

S61. SEND ELECTRONIC MAIL

S62. ARE THERE CONTENTS SENT BY FACSIMILE?

S63. SEND BY FACSIMILE

S64. STORE RESULT

END